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EXAMINER
FORMAN, BETTY J

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 06/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/746,620	DE LUMLEY-WOODYEAR ET AL.	
	Examiner	Art Unit	
	BJ Forman	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8-11,33-35,37-48 and 53-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 8-11, 33-35, 37-48, 53-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

FINAL ACTION

1. This action is in response to papers filed 7 April 2003 in which claims 1-5, 8-9, 33, 37, 40, 45 were amended, claims 6-7, 12-32, 36, 49-52 were canceled and claims 53-56 were added.

All of the amendments have been thoroughly reviewed and entered. The previous rejections in the Office Action dated 6 December are withdrawn in view of the amendments.

All of the arguments have been thoroughly reviewed but are deemed moot in view of the amendments, withdrawn rejections and new grounds for rejection. New grounds for rejection are discussed.

Claims 1-5, 8-11, 33-35, 37-48 and 53-56 are under prosecution.

Priority

2. The amendment to the specification inserting a first paragraph cross referencing the prior applications is acknowledged.

Priority

3. Applicant's claim for domestic priority under 35 U.S.C. 119(e) and 120 is acknowledged. The International Application filed 24 June 1999 and the Provisional Applications filed 5 January 1999, 16 July 1998, and 24 June 1998 upon which priority is claimed do not provide adequate support under 35 U.S.C. 112 for claims 4, 5 and 33-48 of this application because

the applications do not disclose the instantly claimed enzyme generates hydrogen peroxide as the detection compound (Claim 4); the enzyme is choline oxidase, hydroxylase, or hydrolase (Claim 5); and a kit comprising a nucleic acid sensor (Claims 33-48). Because the priority applications do not disclose these instantly claimed limitations, the priority applications do not provide adequate support under 35 U.S.C. 112 for claims 4, 5, and 33-48. Therefore, the effective filing date for claims 4, 5 and 33-48 is the filing date of the instant application i.e. 21 December 2000.

Applicant's Remarks

4. Applicants state that the do not disagree with the above priority statement.

Applicant's statement is acknowledged.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-4, 8-11, 53 and 56 rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al (WO 97/13870, published 17 April 1997) in view of Wohlstadter et al (U.S. Patent No. 6,207,369, filed 17 September 1996)..

Regarding Claim 1, Heller et al disclose a nucleic acid sensor for detecting target nucleic acids, the sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28). Heller et al further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

The courts have stated that claims drawn to an apparatus must be distinguished from the prior art in terms of structure rather than function see *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA1959). "[A]pparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525,1528 (Fed. Cir. 1990) (see MPEP, 2114).

Heller et al also teach the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array. However, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to

modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

The method step of depositing the sensor nucleic acid does not differentiate the sensor nucleic acid of Heller et al because the resulting product is the same i.e. the sensor nucleic acid of Heller is the same as the sensor nucleic acid deposited electrophoretically.

Regarding Claim 2, Heller et al disclose the sensor wherein the redox polymer comprises a redox hydrogel (page 6, line 29-page 7, line 5).

Regarding Claim 3, Heller et al disclose the sensor wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26).

Regarding Claim 4, Heller et al disclose the sensor wherein the enzyme generates hydrogen peroxide as the detection compound (page 6, lines 5-9).

Regarding Claim 8, Heller et al teach the sensor wherein it discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Regarding Claim 9, Heller et al teach a sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28). Heller et al further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

Heller et al also teach the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array and they do not teach the sensor comprises one or more flow channels having a width of 200μ m of less. However, arrays comprising a plurality of nucleic acid sensors and at least one flow channels were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) and at least one flow channel having a width of 200μ m or less (Column 17, lines 26-54, especially, 50-54) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to

provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill would have been further motivated to provide one or more flow channels on the array for the obvious benefits of channeling solutions a taught by Wohlstadter et al (Column 17, lines 27-30).

Regarding Claim 10, Heller et al teach the sensor wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26).

Regarding Claim 11, Heller et al teach the sensor wherein it discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Regarding Claim 53, Heller et al teach a sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28) wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26) and wherein the sensor discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Heller et al further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

Heller et al also teach the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array and they do not teach the electrodes are

about 1-10μ m in diameter or the sensor comprises one or more flow channels having a width of 200μ m of less. However, arrays comprising a plurality of nucleic acid sensors having electrode diameters of 1-10μ m and at least one flow channels were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the electrodes are about 1-10μ m in diameter (Column 15, lines 21-23) and at least one flow channel having a width of 200μ m or less (Column 17, lines 26-54, especially, 50-54) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill would have been further motivated to provide one or more flow channels on the array for the obvious benefits of channeling solutions a taught by Wohlstadter et al (Column 17, lines 27-30).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is

unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

The method step of depositing the sensor nucleic acid does not differentiate the sensor nucleic acid of Heller et al because the resulting product is the same i.e. the sensor nucleic acid of Heller is the same as the sensor nucleic acid deposited electrophoretically.

Regarding Claim 56, Heller et al teach a sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28) wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26) and wherein the sensor discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Heller et al further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

Heller et al also teach the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array and they do not teach one or more flow channels having a width of 200μ m of less. However, arrays comprising a plurality of nucleic acid sensors having at least one flow channels were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array

of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the electrodes are about 1-10μ m in diameter (Column 15, lines 21-23) and at least one flow channel having a width of 200μ m or less (Column 17, lines 26-54, especially, 50-54) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill would have been further motivated to provide one or more flow channels on the array for the obvious benefits of channeling solutions a taught by Wohlstadter et al (Column 17, lines 27-30).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

The method step of depositing the sensor nucleic acid does not differentiate the sensor nucleic acid of Heller et al because the resulting product is the same i.e. the sensor nucleic acid of Heller is the same as a sensor nucleic acid deposited electrophoretically.

7. Claims 1-4 rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al (U.S. Patent No. 5,665,222, filed 11 October 1995) in view of Wohlstadter et al (U.S. Patent No. 6,207,369, filed 17 September 1996).

Regarding Claim 1, Heller et al disclose a nucleic acid sensor for detecting target nucleic acids, the sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (Column 6, lines 29-58). Heller et al further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (Column 5, lines 6-38 and Column 6, lines 56-58). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

Heller et al also teach the sensor differentiates between nucleic acid hybrids on the sensor (Column 7, lines 2-9) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array. However, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox

polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (Column 7, limes 2-9) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

The method step of depositing the sensor nucleic acid does not differentiate the sensor nucleic acid of Heller et al because the resulting product is the same i.e. the sensor nucleic acid of Heller is the same as the sensor nucleic acid deposited electrophoretically.

Regarding Claim 2, Heller et al disclose the sensor wherein the redox polymer comprises a redox hydrogel (Column 3, lines 18-31).

Regarding Claim 3, Heller et al disclose the sensor wherein the enzyme is immobilized in the redox polymer (Column 3, lines 18-31 and Column 5, lines 6-38).

Regarding Claim 4, Heller et al disclose the sensor wherein the enzyme generates hydrogen peroxide as the detection compound (Column 5, lines 6-11).

8. Claim 5 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al (a) (WO 97/13870, published 17 April 1997) in view of Wohlstadter et al (U.S. Patent No. 6,207,369, filed 17 September 1996) as applied to Claim 1 above and further in view of Heller et al (b) (U.S. Patent Application Publication No. 2002/0001799 A1, filed 24 August 1998).

Regarding Claim 5, Heller et al (a) teach the nucleic acid sensor for detecting target nucleic acids, the sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28). Heller et al (a) further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor. Additionally, Heller et al (a) teach the enzyme is usually an oxidase Page 6, lines 21-23) but they do not specifically teach the oxidase is choline oxidase. However, choline oxidase was well known in the art to be stable and non-toxic and to produce hydrogen peroxide as taught by Heller et al (b) (¶ 23 and 49). It would have been obvious to one of

ordinary skill in the art at the time the claimed invention was made to apply the choline oxidase of Heller et al (b) to the general oxidase suggestion of Heller et al (a) and to immobilize the choline oxidase in the redox polymer thereby utilizing a stable, non-toxic hydrogen peroxide producing enzyme as taught by Heller et al (b) for the obvious be increased stability and reduced toxicity.

Regarding Claim 54, Heller et al (a) disclose a nucleic acid sensor for detecting target nucleic acids, the sensor comprising an electrode; redox polymer disposed on the electrode; enzyme disposed on the electrode; and a sensor nucleic acid coupled to the redox polymer (page 4, lines 5-15; page 5, line 12-page 6, line 26; and page 7, line 29-page 8, line 28) wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26) wherein the enzyme generates hydrogen peroxide as the detection compound (page 6, lines 5-9) and wherein it discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Heller et al (a) further disclose the sensor wherein the presence of the substrate generates a detection compound and wherein the binding of the sensor nucleic acid to the target results in an increased rate of oxidation or reduction (page 6, lines 5-26 and page 7, line 29-page 8, line 28). However, the recited sensor and target interaction in the presence of the substrate describes a function and/or intended use of the nucleic acid sensor but does not describe structural elements of the sensor.

Heller et al (a) also teach the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not specifically teach the array. However, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13).

Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al (a) by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

Additionally, Heller et al (a) teach the enzyme is usually an oxidase Page 6, lines 21-23) but they do not specifically teach the oxidase is choline oxidase. However, choline oxidase was well known in the art to be stable and non-toxic and to produce hydrogen peroxide as taught by Heller et al (b) (¶ 23 and 49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the choline oxidase of Heller et al (b) to the general oxidase suggestion of Heller et al (a) and to immobilize the choline oxidase in the redox polymer thereby utilizing a stable, non-toxic hydrogen peroxide producing enzyme as taught by Heller et al (b) for the obvious be increased stability and reduced toxicity.

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is

unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

9. Claims 33-35, 37-48 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al (WO 97/13870, published 17 April 1997) in view of Wohlstadter et al (U.S. Patent No. 6,207,369, filed 17 September 1996) and Stratagene (catalog, 1988, page 39).

Regarding Claim 33, Heller et al teach a sensor for detecting a target nucleic acid comprising: a nucleic acid sensor comprising: an electrode, redox polymer disposed on the electrode; enzyme wherein in the presence of a substrate, the enzyme generates a detection compound and a sensor nucleic acid coupled to the redox polymer and a probe nucleic acid wherein the probe is coupled to a catalyst wherein the catalyst catalyzes an electrochemical reaction of the detection compound upon hybridization of the sensor nucleic acid to the probe nucleic acid (page 7, line 29-page 8, line 10). Heller et al do not teach the sensor in a kit format. However, Wohlstadter et al teach the similar sensor comprising an electrode, redox polymer disposed on the electrode; enzyme wherein in the presence of a substrate, the enzyme generates a detection compound (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; Column 18, lines 19-65; and Column 26, lines 18-25) wherein the sensor is in a kit format (Column 7, lines 19-45 and Claim 1).

Heller et al teach the sensor wherein the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensors but they do not specifically teach an array. However, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed

invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

Additionally, Stratagene catalog teaches a motivation to combine reagents into kit format (page 39). It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine the sensor of Heller et al into a kit format as discussed by Wohlstadter et al and Stratagene catalog since the Stratagene catalog teaches a motivation for combining reagents of use in an assay into a kit, "Each kit provides two services: 1) a variety of different reagents have been assembled and pre-mixed specifically for a defined

set of experiments. 2) The other service provided in a kit is quality control" (page 39, column 1).

Regarding Claim 34, Heller et al teach the sensor wherein the enzyme is disposed on the electrode (page 6, lines 5-26).

Regarding Claim 35, Heller et al teach the sensor wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26).

Regarding Claim 37, Heller et al teach the sensor wherein each sensor comprises an electrode, a redox polymer disposed on the electrode, an enzyme and a sensor nucleic acid coupled to the redox polymer (page 7, line 29-page 8, line 10). Wohlstadter et al teach the similar nucleic acid sensor wherein each sensor comprises an electrode, a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65).

Regarding Claim 38, Heller et al teach the sensor wherein the enzyme is disposed on the electrode (page 6, lines 5-26).

Regarding Claim 39, Heller et al teach the sensor wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26).

Regarding Claim 40, Heller et al teach the sensor wherein it discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Regarding Claim 41, Heller et al teach the sensor wherein the catalyst comprises a thermostable enzyme (page 7, lines 29-31).

Regarding Claim 42, Heller et al teach the sensor wherein the catalyst is a peroxidase (page 7, lines 29-31).

Regarding Claim 43, Heller et al teach the sensor and a substrate for the enzyme (page 6, lines 5-15).

Regarding Claim 44, Heller et al teach the substrate is hydrogen peroxide or glucose (page 6, lines 5-15 and page 71, line 29-page 8, line 10).

Regarding Claim 45, Heller et al teach a sensor for detecting a target nucleic acid comprising an electrode, redox polymer disposed on the electrode, a sensor nucleic acid coupled to the redox polymer and a probe nucleic acid coupled to a thermostable enzyme wherein the thermostable enzyme catalyzes an electrochemical reaction of a detection compound upon hybridization of the sensor nucleic acid to a probe nucleic acid. Heller et al do not teach the sensor in a kit format. However, Wohlstadter et al teach the similar sensor comprising an electrode, redox polymer disposed on the electrode; enzyme wherein in the presence of a substrate, the enzyme generates a detection compound (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; Column 18, lines 19-65; and Column 26, lines 18-25) wherein the sensor is in a kit format (Column 7, lines 19-45 and Claim 1). Additionally, Stratagene catalog teaches a motivation to combine reagents into kit format (page 39).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine the sensor of Heller et al into a kit format as discussed by Wohlstadter et al and Stratagene catalog since the Stratagene catalog teaches a motivation for combining reagents of use in an assay into a kit, "Each kit provides two services: 1) a variety of different reagents have been assembled and pre-mixed specifically for a defined set of experiments. 2) The other service provided in a kit is quality control" (page 39, column 1).

Regarding Claim 46, Heller et al teach the sensor further comprising an enzyme wherein in the presence of a substrate, the enzyme generates a detection compound (page 6, lines 5-26).

Regarding Claim 47, Heller et al teach the sensor wherein the enzyme is disposed on the electrode (page 6, lines 26).

Regarding Claim 48, Heller et al teach the sensor wherein the enzyme is immobilized in the redox polymer (page 6, lines 26).

Regarding Claim 55, Heller et al teach a sensor for detecting a target nucleic acid comprising: a nucleic acid sensor comprising: an electrode, redox polymer disposed on the electrode; enzyme wherein in the presence of a substrate, the enzyme generates a detection compound and a sensor nucleic acid coupled to the redox polymer and a probe nucleic acid wherein the probe is coupled to a catalyst wherein the catalyst catalyzes an electrochemical reaction of the detection compound upon hybridization of the sensor nucleic acid to the probe nucleic acid (page 7, line 29-page 8, line 10) wherein the enzyme is disposed on the electrode (page 6, lines 5-26) wherein the enzyme is immobilized in the redox polymer (page 6, lines 5-26) and wherein the sensor discriminates between hybrids on the sensor (page 8, lines 16-24), different nucleic acids are on the sensor. Therefore, the sensor nucleic acids of at least two of Heller's nucleic acids are different.

Heller et al do not teach the sensor in a kit format. However, Wohlstadter et al teach the similar sensor comprising an electrode, redox polymer disposed on the electrode; enzyme wherein in the presence of a substrate, the enzyme generates a detection compound (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; Column 18, lines 19-65; and Column 26, lines 18-25) wherein the sensor is in a kit format (Column 7, lines 19-45 and Claim 1).

Heller et al teach the sensor wherein the sensor differentiates between nucleic acid hybrids on the sensor (page 8, lines 16-24) which clearly suggest an array comprising a plurality of nucleic acid sensors but they do not specifically teach an array. However, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column

18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (page 8, lines 16-24) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

Heller et al do not teach an electrophoretically deposited sensor nucleic acid. However, the courts have stated that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.

Additionally, Stratagene catalog teaches a motivation to combine reagents into kit format (page 39). It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine the sensor of Heller et al into a kit format as discussed by Wohlstadter et al and Stratagene catalog since the Stratagene catalog teaches a motivation for combining reagents of use in an assay into a kit, "Each kit provides two services: 1) a variety of different reagents have been assembled and pre-mixed specifically for a defined set of experiments. 2) The other service provided in a kit is quality control" (page 39, column 1).

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-4 and 8-11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 5,665,222 in view of Wohlstadter et al (U.S. Patent No. 6,207,369, filed 17 September 1996).

Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are drawn to a sensor comprising an electrode, a redox polymer an enzyme on the electrode and a nucleic acid sensor and differ only in the arrangement of the limitations. For example, instant claim 1 recites a nucleic acid sensor while claim 4 of the '222 patent limits the sensor to a nucleic acid. As such the instantly claimed nucleic acid sensor is obvious in view of the patent claims 1-9.

The claim set further differ in that the instant claims are drawn to an array of sensors. While the patent claims do not recite an array of sensors the patent disclosure teaches the sensor differentiates between nucleic acid hybrids on the sensor (Column 7, lines 2-9) which clearly suggest an array comprising a plurality of nucleic acid sensor but they do not

specifically teach the array. Furthermore, arrays comprising a plurality of nucleic acid sensors were well know in the art at the time the claimed invention was made as taught by Wohlstadter et al (Column 8, line 20-Column 9, line 30 and Fig. 5-13). Wohlstadter et al teach a similar nucleic acid sensor comprising an array of electrodes a redox polymer disposed on the electrode and a sensor nucleic acid coupled to the redox polymer (Column 11, line 60-Column 12, line 37; Column 15, lines 47-63; and Column 18, lines 19-65) wherein the array of electrically isolated nucleic acid sensors provides large amounts of data rapidly and efficiently (Column 7, lines 19-45 and Column 31, lines 11-19). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the nucleic acid sensor of Heller et al by providing a plurality of electrically isolated nucleic acid sensors as they suggest (Column 7, lines 2-9) and as taught by Wohlstadter et al (Column 7, lines 19-45 and Column 31, lines 11-19). One of ordinary skill in the art would have been motivated to provide the plurality of isolated nucleic acid sensors for the expected benefit of generating large amounts of data rapidly and efficiently as taught by Wohlstadter et al (Column 7, lines 19-45 and column 31, lines 11-19).

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

13. No claim is allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (703) 306-5878. The examiner can normally be reached on 6:30 TO 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (703) 308-1119. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-4242 for regular communications and (703) 308-8724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

BJ Forman, Ph.D.
Patent Examiner
Art Unit: 1634
June 5, 2003